

**STEPPE WOODLANDS WITH TATARIAN MAPLE (*ACER*
TATARICI-QUERCETUM PUBESCENTIS-ROBORIS) ON THE
GREAT HUNGARIAN PLAIN AND ITS NEIGHBOURHOOD. AN
UNFINISHED SYNTHESIS WITH SUPPLEMENTARY NOTES**

B. ZÓLYOMI†, A. HORVÁTH¹, B. KEVEY² and G. LENDVAI³

¹*Institute of Ecology and Botany, Centre for Ecological Research, Hungarian Academy of Sciences
H-2163 Vácátót, Alkotmány u. 2–4, Hungary; E-mail: ahorvath@botanika.hu*

²*Department of Botany and Phytogeography, and Department of Agrobotany and Viticulture
University of Pécs, H-7624 Pécs, Ifjúság útja 6, Hungary; E-mail: keveyb@ttk.pte.hu*

³*H-7000 Sárbogárd, Ady E. út 162, Hungary; E-mail: gaborlendvai@hotmail.com*

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This paper presents the so far only partially published research material of the late Bálint Zólyomi on one of his major fields of interest, the forest steppe vegetation. The phytosociological tables presented here were found in his bequest indicating that he was going to publish a grand synthesis on this topic, which, however, has not come true. Since no written text accompanied the original tables, a historical overview and a short explanation to the tables are also provided.

Key words: forest steppe, phytosociology, Hungary

INTRODUCTION

A major part of the lifelong scientific contribution of Bálint Zólyomi is his work on the forest steppe vegetation found on the Great Hungarian Plain. The comparative analysis of steppe woodlands in the forest steppe zone growing on chernozem soils is one of his most frequently cited and widely known works (Zólyomi 1957). In this paper, he was the first to identify several forest stands as representatives of steppe woodlands on the loess plateaux in Hungary he named *Acereto tatarici-Quercetum pubescentis-roboris*, and to point out the uniform nature of the steppe woodlands on loess across the European forest steppe zone.

The forests described in the study were mostly restricted to the southern foothills of the mountain ranges. Among them was the forest Kerecsendi-erdő, a new discovery of two ambitious and then young botanists, Pál Jakucs

and Tamás Pócs (see Pócs 2001), which later became the standard of the Pedunculate Oak-Tatarian Maple steppe woodlands in Hungary. Several stands of the Lovasberény Forest on the eastern side of the hills Velencei-hegység, which were studied by Gábor Fekete in 1955 as part of his master's thesis (Fekete 1955), were also included. Zólyomi also collected samples from the hill Somlyó at Fót, and included one relevé from each, the Mezőcsát and Ohat forests, both on the Great Hungarian Plain. The number of the studied stands thus was relatively small. In a work published a year later, Zólyomi (1958) reported the analytical results of a different set of stands, but unfortunately, again in the form of a synoptic table. From the text it is apparent that he included samples from new locations, such as Vácrátót and Budaörs. In the only review on steppe woodlands on loess occurring in Hungary (Zólyomi 1967), he once again used only a synoptic table, which now contained a much larger sample of forests. According to the list of locations, the samples were collected exclusively east of the Danube, and included all relevés published in his first paper under the subassociation *hungaricum*. However, he removed the two forests on the plain from the samples, and placed them in steppe woodlands on alkali soils (*Galatello-Quercetum roboris* Zólyomi et Tallós 1967).

As indicated by these publications, Zólyomi kept working on steppe woodlands over several years. The true scope of this work, however, could not be appreciated from these publications. His work on oak steppe woodlands had been even more extensive than what was perceived from the published data and his comments on the subject. Between 1957 and 1961, he intensively searched for existing remnants, and recorded in detail their phytosociological characteristics. He, however, did not work alone. His most faithful companions were his former students and young colleagues, namely Pál Jakucs, Gábor Fekete and Tamás Pócs from the Herbarium of the Natural History Museum, and Gábor Vida, who not only participated in the surveys of several forests, but also sampled some stands completely alone.

During this period, Zólyomi and his team surveyed and sampled the forests in the central (around the city of Gödöllő) and southern (the neighbourhood of Albertirsa and Pánd) parts of the hills Gödöllői-dombság, on the Great Hungarian Plain, and on the southern foothills of the North Hungarian Mountain Range. We have found unpublished phytosociological tables from Gödöllő and Dormánd in his heritage, which perhaps would be gladly published, as new finds, by current botanists. Zólyomi also did research west of the Danube. In addition to the hills Velencei-hegység, where material was collected by Gábor Fekete, he extended the search for steppe woodland remnants to the Mezőföld. The unpublished vegetation samples collected at Érd and Dunaszentgyörgy are evidence of this.

Apparently, Zólyomi was preparing to publish a major comprehensive synthesis of steppe woodlands in Hungary. This is evident from the two large-sized annotated tables and the accompanying field notes and data sheets found in his bequest, which summarised the results of the more than forty vegetation samples collected in an area that stretches from the Mezőföld in eastern Transdanubia to the river Sajó in northeastern Hungary.

Unfortunately, the majority of his data collected over several years has never been published, although the study of the forest steppe vegetation was one of the main research projects of the Botanical Institute at Vácrátót, the workplace of Zólyomi at the time (Zólyomi 1959). The reason of this is not yet clear.

During the forty years that have passed since then, no significant progress has been made in the study of the forest steppe woodlands growing on chernozem soils in Hungary. In fact, no-one studied this community in detail, and not even at the descriptive level. Regrettably, Gábor Fekete did not discuss steppe woodlands in his book on the forests of the hills Gödöllői-dombság (Fekete 1965), which apparently occurred there. As he indicated, he omitted these forests from his book, because a large analytical work by Bálint Zólyomi had been in progress at that time. Clearly, he referred to the material that has never been published in full. The only paper known to us appeared in 1982 on the thermophilous forests of the Somlyó Hill at Fót (Fekete and Kovács 1982), in which the authors reported phytosociological relevés also on steppe woodlands, among which two were the original samples collected by Zólyomi in 1956. Thus, our recent knowledge on these forests is based exclusively on the works of Zólyomi discussed above.

Recently, scientific attention has gradually shifted to the forest steppe vegetation again owing to its importance in biogeography and vegetation history. However, a considerable portion of the once known woodland stands has suffered drastic changes since the time passed. Gábor Fekete reported in the late eighties that the stands he surveyed in the hills Velencei-hegység had mostly been spoiled by planting Turkey Oak in them. The once remnant woodlands of the cold continental forest steppe in the hills Gödöllői-dombság (Fekete 1965) were also destroyed by forest mismanagement (Fekete, *ex verb.*), although there are reports that a few fragments have recently been located (Molnár 1999, Molnár and Kun 2000). The unfavourable changes observed in the Kerecsend Forest are also significant. In the absence of recent surveys, the fate and current condition of several other, once studied woodlands (the forests at Mezőcsát, Demjén, Sajólád, and the Somlyó Hill at Fót) are unknown.

By the end of the nineties, it became apparent that steppe oak woodlands with Tatarian Maple represent one of the most endangered and rarest vegetation types of the forest steppe in Hungary (Molnár 1999, Molnár and Kun

2000, Bölöni *et al.* 2008). The field surveys launched at the same time were aimed at providing the foundation for future research by locating all the still existing steppe woodland remnants besides the once known stands. The first catalogue of this data base has been put together (Molnár 1999), from which, however, several, once studied stands, and even entire regions were omitted.

Our knowledge on steppe woodlands on chernozem soils cannot be complete without publishing the survey material of the once studied stands. Following the suggestions and advice of Prof. Gábor Fekete, and also as a tribute to the author and first researcher of the association, we decided therefore to make available for the public the whole research material of Bálint Zólyomi as known to us, of which a considerable portion has never been published, and a part of it has been available only in synoptic tables. We believe that by this we can pay one of the largest and very long lasting debts in the field of vegetation science in Hungary, and thereby draw the attention to the importance of the works and accomplishments of our forerunners. Our primary goal is to make public even the data and information on this subject that Bálint Zólyomi accumulated during his scientific career, but were never scientifically analysed and made available for scientific research.

It follows that it is by no means our goal to evaluate the data in any way in this research material. Instead, we made great effort to accurately reproduce the strictly original material. We preserved the scientific names of the species used in the manuscripts and species grouping, the subassociation names applied by the author, as well as the abbreviations used in his tables. Deviations from the original manuscript occur only in three details. First, we placed the accidental species back into the tables for better reading as opposed to Zólyomi, who summarised them in a list at the end of each section of his tables. Second, we listed the A–D and K values of each subassociation not at the right end of the table in separate columns, but directly next to the columns of the corresponding syntaxonomic unit. Third, we corrected the apparent typographical errors in the tables written by a conventional typewriter.

We hope that the amount and details of the research material published here will themselves convince everyone about the lifelong achievements of Bálint Zólyomi on this subject. The floristical data that may be derived from these relevés and the published locations of the studied stands may further stimulate the search for even further remnant stands of steppe woodlands and the study of their flora and vegetation.

ABOUT THE RESEARCH MATERIAL IN THE MANUSCRIPT

Zólyomi summarised the results of his research on steppe woodlands on loess bedrock in two typed and annotated large-sized tables. The first table

contains the data of 21 vegetation samples collected east of the Danube. They were named by Zólyomi as the regional association *Aceri tatarici-Quercetum pubescentis-roboris hungaricum* (Appendices 1 & 2). The second table includes 22 relevés that were collected in part west of the Danube in the Velence Hills, the Tétény Plateau, and the Mezőföld, and in part at the southern foothills of the Cserehát Hills (Fót, Kosd, Vácrátót). They were named the *Aceri tatarici-Quercetum pubescentis-roboris submatricum* association (Appendices 3 & 4).

Zólyomi included all of the first table in the synoptic table in his 1967 paper. The better part of the second table, however, is essentially unpublished, as only a small fraction was used in the 1958 study, also in the form of a synoptic table. The only relevés published individually are the ones from Fót (Fekete and Kovács 1982).

The two tables are further divided into parts, which Zólyomi distinguished as subassociations. Both tables contain the subassociations *festucetosum* and *lithospermetosum*, which mainly differ in the density of the forest canopy and, as a consequence, the composition of the understory. In addition, the first table also contains the subassociation *galietosum*, in which the proportion of mesophilous forest herbs indicating more mesic conditions is higher. These categories reflect the original view of Zólyomi on the regional and habitat variation of the association.

With the inclusion of TWR values and categories of geographical distribution and life-forms, the tables provide ample information on the then current view on the ecological features, distribution patterns, and phytosociological affinities of the included species. For the latter, Zólyomi used various symbols next to species names, which, however, are not always defined in the heading of the appropriate section.

While editing the tables, we noticed that Zólyomi reported the occurrence of Pannonian Ash (*Fraxinus angustifolia* subsp. *pannonica*) for the Kerecsend forest. However, one of the authors (B. K.) searched for this species in vain, while working recently at the same location, and found only the related Common Ash (*F. excelsior*). As the former species is restricted mainly to mesic-moist habitats and thus occurs on river floodplains in Hungary, it is likely that Zólyomi has mistaken common ash for Pannonian Ash, an error easily made because of the strong resemblance of the two species.

The supplementary data on the relevés are often incomplete. Unfortunately, Zólyomi often made his notes on a piece of paper happened to be at hand, some of which may still be found in his bequest. However, even these do not show the date or other circumstantial information. His lack of care is indicated by his later notes, in which he made an attempt to collect all the data for every relevé, and where huge question marks indicate the missing data. Occasionally, even the sample location was uncertain for Zólyomi. Thus, even

with the help of his often deficient diary and field notes we managed to collect only part of the supplementary data. We have been unable to recover any additional information on the rest so far.

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Appendix 1. Description of the relevés of the *Aceri tatarici-Quercetum pubescentis-roboris hungaricum* samples

Location	Date of relevés		Elevation a.s.l. (m)	Area (m ²)	Declination (°)	Exposition	Made by	
	first	second					first	second
1: Pánd: Hársas	10.05.1959		180	400	10–25	NNW	Zólyomi–Ulbrich–Stieber	
2: Alberti, 2nd valley	28.04.1959	02.07.1961	175	100	2–10	NOO	Zólyomi–Máthé–Kovács–Fekete	
3: Kerecsend: Fácános, SW corner	17.06.1956	02.05.1957	145	225	2–6	E	Zólyomi–(V)	Zólyomi–Pócs–Vajda
4: Demjén	02.05.1957	25.10.1960	210		0	–	Zólyomi–Pócs–Vajda	
5: Demjén	25.10.1960		180	400	5–10	SWW	Zólyomi–Fekete	
6: Felsővadász (Cserehát): Nagy-erdő	27.06.1957		240–60		0–3	SE	Zólyomi–Jakucs–Futák	
1: Alberti: Hársas, 3rd valley	02.07.1961		170	400	5–10	NE	Zólyomi	
2: Alberti, 2nd valley	28.04.1959	04.10.1960	185	200	0	–	Zólyomi–Máthé–Kovács	
3: Alberti, 2nd valley	28.04.1959	04.10.1960	170	200	2–5	NE	Zólyomi–Máthé–Kovács	
4: Alberti: Hársas, 1st valley								
5: Kerecsend a, NW corner	26.06.1956	02.05.1957	155	300	0	–	Zólyomi–Kárpáti–Újvárosi	
6: Kerecsend b, NE corner (útbejáró)	1955	02.05.1957	150		0	–	Zólyomi–Pócs–Vajda	
7: Kerecsend c, S corner	1955	02.05.1957	140		0–15	S	Zólyomi–Pócs–Vajda	

Appendix 1 (continued)

Location	Date of relevés		El- vation a.s.l. (m)	Area (m ²)	Decl- ination (°)	Exposi- tion	Made by	
	first	second					first	second
8: Kerecsend g.	09.05.1995	10.05.1959	140				Zólyomi–Pócs–Med- vecka–Kornas	Zólyomi– Futák–Mi- halkó
9: Vécs-Feldebrő	25.10.1960	03.04.1961	145	400	0	–	Zólyomi–Fekete	Zólyomi
10: Alberti ?	28.04.1959	04.10.1960	180	200	15	SSW	Zólyomi–Máthé– Kovács–Fekete	
1: Aszaló: Pap-erdő		26.10.1960	220	400	0	S	Zólyomi–Fekete	
2: Aszaló: Pap-erdő	17.05.1960	26.10.1960	170	400	0–5	–	Zólyomi–Fekete	
3: Sajóvámos: Frank-h.	27.10.1960	13.05.1961	225	200	0–2	S	Zólyomi–Fekete	
4: Sajóvámos: Frank-h.	27.10.1960	13.05.1961	260	250	0–2	S	Zólyomi–Fekete	
5: Kislémedi Szóri- völgy		27.06.1961	140	400	5	NNW	Zólyomi	

Appendix 2. *Aceri tatarici-Quercetum pubescentis-roboris hungaricum*

T W R			festucetosum										lithopermetosum										galietosum								
1	2	3	4	5	6	K	A-D	1	2	3	4	5	6	7	8	9	10	K	A-D	1	2	3	4	5	K	A-D					
Aceri-Quercion (Prunus spinosae-fruticosae) species																															
6k	4k	4	P-Pann	MM	A2																										
						-	-	-	1	-	-	-	(-+)	-	-	(1) 1(-2)	-	+	+1	-	-	-	-	2	+	+					
6k	4	4	P-Pann	MM	A2																										
						-	-	-	1	-	-	-	(-+)	-	-	(1) 1(-2)	-	+	+1	-	-	-	-	2	+	+					
						1	+1	2	x	(+)	-	V	+2	+	+	2	2	2	2	2	2	V	+2	+	1-2	2	2	3	V	+3	
6k	2	4	Kt	M	B2																										
						-	-	1	+	+	-	III	+1	-	+	2						II	+2	+	-	+	+	1	III	+1	
6k	2	4	Eua-Kt	M	B1																										
						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1(2)	1	+2	-	(+)	+	+	IV	+
6k	2	4	Eua-Kt	M	B2																										
						+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	I	+	
Quercetalia petraeae-pubescentis - Quercetia pubescenti-petraeae (= common with Carpino-Fagetea) species																															
6a	2	5	Subm	MM	A1-(A2)																										
						3	4	2	3	2	2	V	2-4	3-4	2-3	-2	3	3	1-2	(x)	+	2	(+)	V	+3	1	-	1	(+)	III	+1
						-	-	+	+	+	+	+1	II	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
						-	-	+	+	+	+	+1	II	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
5a	4	3	Eua	M	B2																										
						1-2	1	x	1	+	V	+1	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
5a	3	3	Eua	M	B1																										
						+	-	+	x	-	-	III	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
5a	4	4	Balk-Eu	M	B1																										
						+	1	-	x	-	-	III	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
5a	3	3	Subm(or)	MM	A1-(A2)																										
						-	-	4	1-2	3	3-4	IV	1-4	-	-	-	3	3	4	3	2	2	2	2	2	2	2	2	2	2	
						-	-	1	-	1	2	III	1-2	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
						+	-	1	2	2	1	V	+2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
5a	3	4	Eua	M	B1																										
						+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
5	3	4	Eua	MM	A2																										
						-	-	+	+	+	(+)	-	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
						-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
6a	2	4	P-Subm	M	B1																										
						(+)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
6a	4	4	Subm-Em	MM	A1-(A2)																										
						-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
6a	3	4	Subm-Em	M	B1																										
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						+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Quercetalia petraeae-pubescentis - Quercetia pubescenti-petraeae (= common with Carpino-Fagetea) species																															
5a	6	0	Eu	MM	A1-(A2)																										
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						-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
5a	4	4	Eu	MM	A2																										
						-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
						1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
						-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
5a	5	3	Eu	M	B1																										
						+	+1	+	x	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
5a	4	3	Eu	M	B1																										
						-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
5a	3	3	Eu	M	B1																										
						+	-	+	1	x	1	V	+1	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
5a	4	4	Balk-Eu	M	B1																										
						+	1	-	x	-	-	III	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
5a	3	3	Subm(or)	MM	A1-(A2)																										
						-	-	4	1-2	3	3-4	IV	1-4	-	-	-	3	3	4	3	2	2	2	2	2	2	2	2	2	2	
						-	-	1	-	1	2	III	1-2	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
						+	-	1	2	2	1	V	+2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
5a	3	4	Eua	M	B1																										
						+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
5	3	4	Eua	MM	A2																										
						-	-	+	+	+	(+)	-	1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
						-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
6a	2	4	P-Subm	M	B1																										
						(+)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
6a	4	4	Subm-Em	MM	A1-(A2)																										
						-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
						-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
6a	3	4	Subm-Em	M	B1																										
						+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
						+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Quercetalia petraeae-pubescentis - Quercetia pubescenti-petraeae (= common with Carpino-Fagetea) species																															
5a	6	0	Eu	MM	A1-(A2)																										
						-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
						-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
5a	4	4	Eu	MM	A2																										
						-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
						1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
						-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
5a	5	3	Eu	M	B1																										
						+	+1	+	x	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
5a	4	3	Eu	M	B1																										

Appendix 2 (continued)

			festucetosum										lithospermetosum										galletosum							
T	W	R	1	2	3	4	5	6	K	A-D	1	2	3	4	5	6	7	8	9	10	K	A-D	1	2	3	4	5	K	A-D	
5k	4	4	Kt	-	-	-	+	-	II	+1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
5a	3	4	Eua	1	+	-	-	-	II	+1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
6a	2	5	P-Subm	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
5k	3	5	Eu-Kt	-	-	-	-	-	I	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
6a	4	4	Subm	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
5	3	4	Eua	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
5a	2	5	Kt	-	-	-	-	-	II	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
5a	4	3	Em	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
5k	4	3	Eua	-	-	-	-	-	II	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
5	4	3	Eua	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
5a	3	4	Eu	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
6a	3	5	P-Subm	1	-	0-1	+	-	(+)	I	+	1-2	2-3	1	2	2-3	1(-3)	+3	(+)	1-2	-	V	+2	+	-	-	-	-	-	-
5k	3	4	Em	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
5a	3	4	Eua	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
5a	3	2	Eua	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
5a	4	3	Eua	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
5k	3	4	Kt	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
5a	2	5	Em-Subm	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
5	3	3		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
5k	3	3	Eua	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
5a	3	4	Subm-Em	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
5k	2	4	Kt	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
6a	4	3	Subm-Em	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
5	3	4	Kt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
5a	3	3	Eua	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
4k	4	4	Eua	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
5	3	3	Cp	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
7a	3	3	Atl-Subm	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
6k	3	5	Kt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
6k	4	2	Em	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
5a	4	3	Em	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
5a	3	2	Em-Subm	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
6	3	4	Subm-Em	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
5k	2	3	Eua	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
5k	3	5	Em	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
5a	3	3	Eua	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
5a	3	3	Em-Subm	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
5a	3	3	Em-Subm	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
5k	3	4	Kt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Quercu-Fagetea s. l. (0 = Carpino-Fagetea) species																														
5	5	3	Eua	-	-	-	+	-	V	+1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
6k	5	4	P-Pann	+	-	0-3	-	-	III	+3	1(-4)	2	1-3	1	2	+2	1-2	1-2	+1	-	-	-	-	-	-	-	-	-	-	-
6k	4	4	Em	1	3	0-2	-	-	III	1-3	+2	+	+	2	+	-	+	-	(+)	+	+	+	+	+	+	+	+	+	+	+
5	6	4	Cp	-	-	-	-	-	II	+1	1	+	1	+1	2	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+

Appendix 2 (continued)

										festucetosum										lithospermetosum										galietosum									
T	W	R	1	2	3	4	5	6	K	A-D	1	2	3	4	5	6	7	8	9	10	K	A-D	1	2	3	4	5	K	A-D										
5	6	0	Cp																																				
6k	2	4	P-Pann																																				
6	3	5	Eua-Kt																																				
5k	2	4	Eua-Kt																																				
5k	3	4	Eua-Kt																																				
6k	2	4	Kt-Eu																																				
6k	2	4	Kt-Eu																																				
5	3	3	Eua																																				
6	0	5	Eua																																				
5k	3	3	Eua-Kt																																				
5a	3	1	Em																																				
5k	1	4	Eua																																				
6k	2	4	P-Subm																																				
5k	2	4	Eua-Kt																																				
6a	3	4	P-Subm																																				
5k	3	4	Eua																																				
5k	3	4	Eua-Kt																																				
5k	4	4	Eua-Kt																																				
6k	6	5	Eua-Kt																																				
5a	3	3	Em-Subm																																				
6k	3	3	P																																				
7	2	4	Eua																																				
6k	2	5	P-Subm																																				
6a	2	0	Subm-Em																																				
6k	3	4	Kt																																				
5a	3	3	Eua																																				
6	1	5	P-Subm																																				
5	2	3	Pann																																				
5k	1	4	Eua																																				
6k	2	4	P																																				
6	2	4	Eua																																				
7	2	4	Eua																																				
5k	3	4	P-Pann																																				
6a	3	3	Subm																																				
5	4	4	Pann-Karp																																				
6	2	4	Balk-Pann																																				
6a	2	4	Subm-Em																																				
5	8	4	Cp																																				
5a	1	3	Eu																																				
6k	2	4	P-Pann																																				
5	2	3	Cp																																				
5	4	0	Eua-Kt																																				
5a	4	0	Eua																																				

Appendix 2 (continued)

			festucetosum										lithospermetosum										galietosum									
T	W	R	1	2	3	4	5	6	K	A-D	1	2	3	4	5	6	7	8	9	10	K	A-D	1	2	3	4	5	K	A-D			
6a	2	5	+	-	-	-	-	-	I	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
6a	2	4	-	+	-	-	-	-	I	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
5	5	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
6	2	4	+	-	-	-	-	-	I	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
6	3	0	-	+	-	-	-	-	I	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
6k	2	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
5a	1	3	-	-	-	-	+	-	I	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Accompanying species																																
5k	3	0	-	+	2	+	1	V	+	+2	-	-	-	-	-	+	-	+	+	-	II	+	-	+	-	-	-	-	-	-		
5a	4	4	-	+	-	-	-	II	+	-	-	-	-	-	-	-	-	-	-	-	II	+1	x	-	+	-	-	-	-	-		
5a	4	4	-	-	-	-	-	II	1	1	1	1	1	1	1	-1	-1	+(-2)	-	+	IV	+1	1-2	-	1	-	-	-	-	-		
5	5	3	-	+	+	-	-	I	+	1-2	+	-	-	-	-	2	+	+	-	-	III	+2	+1	-	+	-	-	-	-	-		
5	7	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
5a	3	2	-	-	-	-	-	-	I	+	-	-	-	-	-	-	-	-	-	-	I	+	-	+1	+	-	-	-	-	-		
5	3	0	-	-	-	-	+	+	III	+	-	-	-	-	-	-	-	-	-	-	I	+	-	-	-	-	-	-	-	-		
5	8	0	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-		
5a	4	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-		
5a	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
5a	7	4	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
5	6	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
5	4	3	-	-	-	-	+	+	I	+	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-		
5k	5	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-		
6k	4	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-		
Culta et ruderalia																																
Cult			1-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
5a	5	3	1	+	-	-	-	-	I	1	+	+	2	2-3	2	-	-	-	-	-	II	+3	-	-	-	-	-	-	-	-		
5	4	0	2	-	-	-	-	-	II	+1	+	+	1	1	1	+	-	-	-	-	III	+1	+	-	-	-	-	-	-	-		
5	6	4	-	+	-	-	-	-	II	1-2	2	1	2	2	2	+	-	-	-	-	III	+2	1	-	-	-	-	-	-	-		
7k	3	4	+	-	-	-	-	-	I	+	+	+	+	+	+	-	-	-	-	-	II	+	+	+	+	+	+	+	+	+		
5a	5	3	-	+	+	+	+	-	III	+	+	+	+	+	+	0-1	-	-	-	-	II	+1	+	-	+	+	+	+	+	+		
6k	5	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
0	5	0	-	+	+	+	+	-	I	+	-	-	-	-	-	-	-	-	-	-	II	+	-	+	-	+	+	+	+	+		
0	5	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
5	1	4	+	-	-	-	-	-	II	+	+	+	+	+	+	-	-	-	-	-	I	+	+	+	+	+	+	+	+	+		
5	3	0	-	-	-	-	-	-	II	+	+	+	+	+	+	-	-	-	-	-	I	+	+	+	+	+	+	+	+	+		
5a	6	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
5a	5	3	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
5a	5	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
5a	5	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
5a	5	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		

Appendix 2 (continued)

T	W	R	festucetosum						lithospermetosum										galietosum										
			1	2	3	4	5	6	K	A-D	1	2	3	4	5	6	7	8	9	10	K	A-D	1	2	3	4	5	K	A-D

Appendix 3. Description of the relevés of the Aceri tatarici-Quercetum submatricum samples

Location	Date of relevés		El-elevation (a.s.l.) (m)	Area (m ²)	Declination (°)	Exposition	Made by	
	first	second					first	second
1: Valkó	1960						Zólyomi-Fekete	Zólyomi-Jakucs-Hoffman
2: Pusztaszentiakab (Haraszti-erdő)	1960			100	0	-	Fekete	
3: Gödöllő-Iharos	1959						Zólyomi	
4: Fót	1957				0-15	SW	Zólyomi-Futák-Kárpáti	
5: Kosd: Urasági-erdő	25.05.1958		270	100	0-20	SSW	Vida	
6: Dunaszentgyörgy							Zólyomi	
7: Érd	07.05.1958			400	30	NNE	Zólyomi	
8: Meleg-hegy (1)							Fekete (1955) sub <i>Querceto-Lithospermetum</i> (1)	
9: Meleg-hegy (2)							Fekete (1955) sub <i>Querceto-Lithospermetum</i> (2)	

Appendix 3 (continued)

Location	Date of relevés		El-eva-tion (a.s.l.) (m)	Area (m ²)	Declina-tion (°)	Expo-sition	Made by	
	first	second					first	second
10: Meleg-hegy (3)	Fekete (1955) sub <i>Querceto-Lithospermetum</i> (3)							
11: Meleg-hegy (4)	Fekete (1955) sub <i>Querceto-Lithospermetum</i> (4)							
1: Gödöllő-Órház	1960						Fekete-(Zólyomi)	
2: Gödöllő	1960						Fekete	
3: Gödöllő-Erzsébet	1960						Zólyomi-Jakucs	
4: Fót	18.05.1956				0-5	NW	Zólyomi-Kárpáti	
5: Vácrátót	18.05.1956					W	Zólyomi-Kárpáti	
6: Kamara-erdő	02.10.1957	19.03.1961		400	0-3	NNW	Pócs	Zólyomi
7: Kamara-erdő	02.10.1957	19.03.1961		400	1-2	N	Pócs	Zólyomi
8: Meleg-hegy (sensu Zólyomi, non Fekete 1955)								
9: Alcsút				400	0	-	Zólyomi	
10: Templom-hegy (5)	Fekete (1955) sub <i>Querceto-Lithospermetum</i> (5)							
11: Lovasberényi-erdő (6)	Fekete (1955) sub <i>Querceto-Lithospermetum</i> (6)							

Appendix 4. *Aceri tatarici-Quercetum submatricum*. Abbreviations: V = Valkó, P = Pusztaszentjakab, Gl = Gödöllő-Iharos, F = Fót, K = Kosd, D = Dunaszentgyörgy, E = Érd; M = Meleg-hegy, Gó = Gödöllő Órház, G = Gödöllő, ? = unknown, Fh = Fót H, Vt = Vácátót, Bp = Budapest, Kamara-erdő, A = Alsótűt

T W R			Association, local association and Aceri-Quercion species (Prunion fruticosae species)	festucetosum										lithospermetosum														
				V	P	Gl	F	K	D	E	M	M	M	M	M	M	M	M	M	M	M	M	M					
6k	4	4	P-pann	1	2	3	4	5	6	7	8	9	10	11	A-D	K	G ⁰	G	?	Fh	Vt	Bp	Bp	M	A	M	M	M
6k	2	4	Kt	+	-	-	+	-	-	-	-	1	1	-	-	+	1(2)	-	+	1-2	-	+(-)	-	-	-	-	-	III
6k	2	4	Kt	+	-	-	+	-	-	-	-	1	1	-	-	+	1-2	2-3	2	+(-)	-	-	-	-	-	-	-	III
6k	2	5	Kt	-	-	-	-	-	-	-	-	1-3	+	+	-	+	1	II	-	-	-	-	-	-	-	-	-	-
6k	2	5	Kt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6a	2	5	Subm	3	2-3	3	3	2-3	+	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5a	3	3	Subm(or)	1	-	-	-	+	+	-	+	+	2	3	1-2	2-3	III	-	-	+	-	+	+	+	+	+	+	+
5a	3	4	Eua	1	-	-	2	-	-	1	-	-	-	-	-	2	II	+	+	-	-	1	2	2	4	3	3-4	4
6a	2	5	Subm	1	-	1	1-2	-	+	+	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
5a	4	4	Balk-Em	-	1	2	3	1	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
5a	3	3	Eua	1	1	-	-	+	2	-	-	-	-	-	-	1	1	1	1	1	1	1	1	1	1	1	1	
5a	3	4	Eua	1	-	+	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
5a	3	4	Eua	1	-	+	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	4	4	Subm-Em	-	1-2	-	+	-	-	+	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
6a	3	5	Subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	3	4	Subm-Em	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
5a	4	4	Subm-Em	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
5a	3	4	Eua	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	4	4	Subm-Em	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	4	Subm	1	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5	P-subm	-	-	-	-	-	-	-	-	-	-	-	-	+	1	+	-	-	-	-	-	-	-	-	+	
6a	2	5																										

Appendix 4 (continued)

										festucetum										lithospermetosum										
T	W	R				V	P	GI	F	K	D	E	M	M	M	M	M	M	M	G ⁵	G	?	Fh	Vt	Bp	Bp	M	A	M	M
5a	5	3	Eu	MM	A2	Θ	<i>Tilia cordata</i>	-	-	-	-	-	-	-	-	-	-	-	-	1(2)	2	-	-	-	-	+	-	-	-	-
5a	5	3	Em-Subm	MM	B	Θ	<i>Carpinus betulus</i>	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	1	-	-	-	-	-
5a	5	3	Eu-Subm?	MM	A2	Θ	<i>Corulus aetlana</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
6	5	0	Subm(or)	MM	A1	Θ	<i>Loranthus europaeus</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5a	6	4	Eu	MM	B	Θ	<i>Malus silesitris</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6a	4	4	Subm(or)	MM	B	Θ	<i>Staphylea pinnata</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5a	4	4	Em-Subm	MM	B	Θ	<i>Tilia platyphyllos</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5a	5	3	Eu	MM	B	Θ	<i>Cercasium actium</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6k	4	4	Eu	MM	B	Θ	<i>Acer campestre</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6k	4	4	Eu	MM	B	Θ	<i>Acer tataricum</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6a	2	5	Eu	MM	B	Θ	<i>Fraxinus ornus</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	3	4	Eu	MM	B	Θ	<i>Pyrus achras</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5a	4	0	Eu	MM	B	Θ	<i>Quercus petraea</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6a	2	5	Eu	MM	B	Θ	<i>Quercus pubescens</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5a	6	0	Eu	MM	B	Θ	<i>Quercus robur</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Association, local association and Aceri-Quercion species (Pruniflorae species) != occurring also in Festucetalia associations																														
5k	4	4	Kt	H	C	<i>Pulsanaria mollissima</i> sst	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6k	2	5	P-pann	G	C	<i>Iris variegata</i> sst	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5a	3	4	Subm(or)	H	C	<i>Carex nicheli</i> sst	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	3	5	Pann-balk	H	C	<i>Euphorbia polychroma</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	3	4	Kt	H	C	<i>Phlox tuberosa</i> sst	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6k	3	4	Balk-pann	G	C	<i>Doronicum hungaricum</i> sst	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6k	2	4	P-pann	H	C	<i>! Inula germanica</i> sst	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6k	2	5	Kt	G	C	<i>Lathyrus pannonicus</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5k	3	4	Eu	H	C	subsp. <i>collinus</i> sst	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5k	4	5	Kt	H	C	<i>Nepeta pannonica</i> sst	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5k	4	5	Eu	H	C	<i>Melica altissima</i> sst	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5k	4	5	Eu	H	C	<i>Veronica paniculata</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
subsp. <i>foliosa</i> sst																														
Quercetalia petraeae-pubescentis and Quercetalia pubescentis-petraeae species (+ = species transgrading from Orno-Cotinetalia, □ = subordinately occurring also in Carpinio-Fagetea associations, != occurring also in Festuco-Brometea associations)																														
5a	2	4	Eu	H	C	<i>Brachypodium pinnatum</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5a	3	3	Eu	H	C	□ <i>Calamintha clinopodium</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	2	4	Subm-Em	Ch(H)	C	<i>! Teucrium chamaedrys</i> sst	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5a	3	4	Em	H	C	<i>! Coronilla varia</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6k	2	5	Eu	H	C	<i>! Dictamnus albus</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5a	3	4	Eu	H	C	<i>! Galium mollugo</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6k	4	4	Eu	H	C	<i>Cynanchum vincetoxicum</i> sst	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5a	3	3	Em	H	C	□ <i>Lathyrus niger</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6a	3	5	P-Subm	H	C	<i>Lithospermum purpureo-ceruleum</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	3	4	Kt	G	C	<i>! Polygonatum odoratum</i> sst	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5a	3	4	Eu	H	C	<i>Sedum maximum</i> sst	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6k	3	4	Kt	H	C	<i>! Thalictrum minus</i> sst	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Appendix 4 (continued)

										festucetosum										lithospermetosum									
T	W	R	V	P	Gl	F	K	D	E	M	M	M	M	A-D	K	G	?	Fh	Vt	Bp	Bp	M	A	M	M	A	M	M	
5a	3	4	+	-	+	+	-	-	-	-	-	-	-	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	
6k	3	4	+	-	+	+	+	-	-	-	-	-	-	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	
5	3	0	1	-	+	+	+	-	-	-	-	-	-	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	
5a	2	4	+	-	+	+	+	-	-	-	-	-	-	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	
5a	3	5	+	-	+	+	+	-	-	-	-	-	-	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	
5k	2	5	+	-	+	+	+	-	-	-	-	-	-	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	
5a	3	5	+	-	+	+	+	-	-	-	-	-	-	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	
5a	3	3	+	-	+	+	+	-	-	-	-	-	-	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	
5a	3	4	+	-	+	+	+	-	-	-	-	-	-	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	
5k	3	4	+	-	+	+	+	-	-	-	-	-	-	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	
5	5	4	+	-	+	+	+	-	-	-	-	-	-	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	
6	2	5	+	-	+	+	+	-	-	-	-	-	-	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	
5a	4	0	+	-	+	+	+	-	-	-	-	-	-	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	
5k	4	3	+	-	+	+	+	-	-	-	-	-	-	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	
6a	2	5	+	-	+	+	+	-	-	-	-	-	-	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	
6a	4	3	+	-	+	+	+	-	-	-	-	-	-	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	
5a	4	5	+	-	+	+	+	-	-	-	-	-	-	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	
6a	3	5	+	-	+	+	+	-	-	-	-	-	-	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	
5	3	4	+	-	+	+	+	-	-	-	-	-	-	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	
5	3	4	+	-	+	+	+	-	-	-	-	-	-	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	
5	3	4	+	-	+	+	+	-	-	-	-	-	-	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	
6	3	4	+	-	+	+	+	-	-	-	-	-	-	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	
6a	3	4	+	-	+	+	+	-	-	-	-	-	-	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	
6k	3	4	+	-	+	+	+	-	-	-	-	-	-	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	
5a	4	3	+	-	+	+	+	-	-	-	-	-	-	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	
5a	4	3	+	-	+	+	+	-	-	-	-	-	-	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	
5k	3	4	+	-	+	+	+	-	-	-	-	-	-	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	
5a	5	4	+	-	+	+	+	-	-	-	-	-	-	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	
6k	4	4	+	-	+	+	+	-	-	-	-	-	-	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	
5k	2	3	+	-	+	+	+	-	-	-	-	-	-	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	
6a	3	4	+	-	+	+	+	-	-	-	-	-	-	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	
5	3	4	+	-	+	+	+	-	-	-	-	-	-	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	
5k	3	5	+	-	+	+	+	-	-	-	-	-	-	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	
5k	3	5	+	-	+	+	+	-	-	-	-	-	-	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	
5	4	3	+	-	+	+	+	-	-	-	-	-	-	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	
6	3	4	+	-	+	+	+	-	-	-	-	-	-	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	
4k	4	4	+	-	+	+	+	-	-	-	-	-	-	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	
5	3	3	+	-	+	+	+	-	-	-	-	-	-	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	
5	3	4	+	-	+	+	+	-	-	-	-	-	-	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	
5k	3	4	+	-	+	+	+	-	-	-	-	-	-	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	
5k	3	4	+	-	+	+	+	-	-	-	-	-	-	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	
5	2	4	+	-	+	+	+	-	-	-	-	-	-	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	
5a	3	2	+	-	+	+	+	-	-	-	-	-	-	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	
6a	3	4	+	-	+	+	+	-	-	-	-	-	-	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	
5a	4	3	+	-	+	+	+	-	-	-	-	-	-	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	

Appendix 4 (continued)

		festucetosum										lithospemetosum																			
T	W	R	Eua-Subm	Th-H	V	P	GI	F	K	D	E	M	M	M	M	A-D	K	G	G	?	Fh	Vt	Bp	Bp	M	A	M	M	A	M	M
7	2	4	Eua-Subm	Th-H	-	-	-	+	-	-	-	-	-	-	-	+	+	-	-	-	(+)	-	-	-	-	-	-	-	-	-	-
6k	2	4	Kt-Eu	H	-	-	-	+	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	2	4	Eua	G	-	+	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	2	0	Eua	H	-	-	-	-	-	+	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	2	4	Cp	Th-H	+	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	2	4	Eua	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6a	3	4	P-Subm	H	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6k	2	4	P-pann	H	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6k	3	4	Eua-Kt	G	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5a	2	4	Eua	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5a	6	0	Em	H	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6k	2	4	Pann	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6a	2	4			-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	2	4	Alp-Balk	N	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6k	1	4	P-Subm	H	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6k	1	4	Kt	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5k	3	4	Eua-Kt	H	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-
			Eua	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	3	4	Eua-Kt	H	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	3	4	P-pann	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6k	1	4	Kt	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6k	1	5	P-Subm	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6k	2	4	Eua-Kt	H	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-
6k	2	5	P	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6k	2	4	Eua	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	5	0	Cp	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6a	1	5	Eua	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	2	4	P	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6a	2	4	Eua-Kt	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6k	2	4	Kt	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6k	2	4	P-Subm	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6k	2	4	Kt?	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6k	2	5	P-pann	TH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	1	4	Eua	Ch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	2	3	Kt	Ch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6k	1	4	Em	H	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6k	2	4	Kt	Th	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Quercus-Fagetea (0 = Fagetea-Carpino-Fagetea species)																															
5a	5	4	Eua	H	1	1-2	-	-	1	-	-	-	-	-	-	-	-	1	1	+	1-2	1-2	+	+	x	1(3)	+	-	+1	V	
5	4	4	Cp	H	-	+1	+	-	+1	-	-	-	-	-	-	-	-	+	+	+	+	+	+	+	+	+	-	-	+1	V	
5a	4	4	Eua	H(-Ch)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5a	6	4	Eua	H	1	1-2	1-2	+	-	-	-	-	-	-	-	-	-	1(2)	1(2)	+	2	-	+1	-	-	1(2)	+1	+	+2	IV	

Appendix 4 (continued)

-P																											
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